

RESECTION OF THE PYLORUS FOR CANCER.

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Illustrative examples of surgical treatment in organic diseases of the abdomen, one of the great borderlands of medicine and surgery, are still much required in order to fill up gaps in our knowledge. It is only by accumulating cases in which surgical intervention has been employed, that we can reach definite conclusions as to the best means of such treatment. Records of cases which have terminated favourably are in themselves insufficient; it is only by the candid presentation of failures as well as successes that any real assistance can be afforded on such a subject. For these reasons we desire to give a brief account of 2 cases which have recently been under our care.

CASE I. RESECTION OF THE PYLORUS FOR CANCER.—DEATH FROM SEPTIC PERITONITIS.

Mrs. S., æt. 33, married; was admitted to the Deaconess Hospital, 8th January 1895, on the recommendation of Dr. Veitch, of Edinburgh, complaining of a lump in her stomach and frequent vomiting. She had felt the mass in different parts of the abdomen for about six months, and the vomiting had begun two months previous to admission.

The patient's family history was negative. Her own health had been excellent until the present illness began. A year before, she began to suffer from various symptoms of indigestion, more especially pain after food and vomiting. The vomited matter seemed to be the food almost unaltered, and there certainly never was any substance like coffee grounds. Dr. Veitch treated her by means of peptonised

milk and various remedies, which produced considerable improvement as regards the symptoms of indigestion.

The patient first noticed the lump by accident about six months before admission. There was no persistent pain for some weeks after this discovery, but it gradually developed, and she noticed that it was increased by walking as well as by taking food. About two months before admission the vomiting recommenced. She generally vomited in the evening the food she had taken during the day.

On admission, the patient looked very emaciated, and walked with difficulty. Her legs were painful, and there was some œdema about the ankles. Her weight was 6 st. 11 lbs., and she stated that she had lost about 2 st. in two months. On examination, a hard lump was felt in the right hypochondrium, which seemed to be about the size of a duck's egg. It could be moved for a few inches into the umbilical region, and the patient stated that she had felt it go over to the left side. The mass appeared to be somewhat irregular in outline, but almost smooth, with a curious ridge-like projection in front, passing obliquely inwards. It was very slightly sensitive, and moved upwards and downwards with respiration.

The stomach was considerably dilated, extending to rather below the umbilicus. Splashing sounds could be elicited with great ease. The liver was of normal size, reaching the costal margin in the mammillary line.

The patient vomited every night after her admission to the Hospital. The vomit was filtered and tested for free hydrochloric acid, which was found to be entirely absent. Microscopic examination showed that the solid matters consisted solely of the food elements.

Consideration of all the facts of this case indicated that there was obstruction of a malignant character at the pyloric orifice, as evidenced by the presence of the tumour, the dilated stomach, the absence of any free hydrochloric acid in the gastric contents, and the rapid wasting. It was clear that life could not be much longer sustained without some surgical intervention; and as there appeared to be only one mass in the abdomen, the case seemed to be a favourable one

for exploration. The whole circumstances were fully explained to the patient and her husband, who both welcomed any interference which afforded a prospect of relief.

In the first instance, attempts were made to wash out the stomach, but these failed because the tube, although the largest possible, was at once blocked by pieces of grape and orange which the patient had surreptitiously swallowed.

On the 19th January 1895 the abdomen was opened in the middle line; the tumour was found to involve the pylorus and a considerable area of the pyloric segment of the stomach; there were no adhesions and no visible secondary growths, except two small glands in the transverse mesocolon close to the lower border of the main tumour. It was decided, therefore, to remove the tumour, and to proceed on the lines recommended by Kocher. The greater and lesser omenta were detached from the stomach in the region of and beyond the growth, and the latter brought out at the wound. The duodenum was divided well beyond the tumour between two clamp-forceps. The stomach was clamped on the proximal side of the tumour, and was cut across on the cardiac side of the clamps, while the fingers of the assistant grasped the organ from above and below with the object of preventing any escape of gastric contents. The stomach, however, was so full of fluid and gas that this proved to be impossible, the posterior wall of the divided organ withdrawing itself from the fingers, and a considerable escape took place before the gaping wound could be secured between forceps. The infected gauze was removed, and the wound area disinfected with every possible care.

The bleeding vessels in the divided wall of the stomach were secured, and the edges brought together by a continuous Glover's suture through all the coats, passing from the lesser towards the greater curvature. A continuous Lembert suture was then introduced so as to invaginate the sutured edges and approximate the serous coats in their whole length.

The divided end of the duodenum was then prepared for the insertion of the male half of a 1-in. Murphy's button. When the clamp securing the duodenum was removed, there

was troublesome hæmorrhage from the divided gastroduodenal artery, which retracted to such an extent that it was only secured with difficulty. The female half of the button was then introduced into a wound made for the purpose in the posterior wall of the stomach, parallel with the sutured margin, and about 1 in. distant from it. The two halves of the button were then locked, and, although the junction between stomach and duodenum seemed quite secure, a few interrupted Lembert sutures were introduced as an additional precaution.

The entire wound area was again swabbed out with gauze dipped in sterilised salt solution. No antiseptics had been employed except for the disinfection of the divided mucous surfaces of the stomach and duodenum (gauze dipped in corrosive sublimate, 1 to 1000). The patient reacted well from the operation, but developed symptoms of septic peritonitis, from which she died on the 4th day.

Post-mortem examination showed diffuse septic peritonitis; the junction of the stomach and duodenum was apparently accurate; the stomach itself contained a large quantity of greenish-black fluid, with recognisable grape skins and pieces of orange. There was a small cancerous gland in the lesser omentum close to the lesser curvature, towards the cardiac end of the stomach. There was no cancer elsewhere in the abdomen.

The segment of stomach and duodenum removed measured 16 cm. ($6\frac{1}{4}$ in.) along the greater curvature, and 8 cm. ($3\frac{1}{8}$ in.) along the lesser; it presented in the interior a characteristic cancerous tumour, projecting into, and thereby diminishing the lumen of, the pylorus, so that there was difficulty in passing a slender penholder through it. Microscopic examination of the tumour showed it to be a columnar epithelioma, infiltrating the muscular coat, and undergoing considerable colloid degeneration. There was no appreciable cicatricial contraction or "stricture."

While deploring the fatal result of the operation in this case, we had every reason to believe that the accidents which had contributed to it might be prevented in repeating a similar procedure in the future. The original difficulty lay,

as has been indicated, in the impossibility of emptying the stomach in the ordinary manner beforehand, because of the folly of the patient in swallowing entire grapes and lumps of orange while her pylorus was only the diameter of a crow quill. These sufficed to block any tube that was passed into the stomach. Subsequent experience has shown us, however, that even in a stomach which is *not* empty at the time of operation, all leakage may be prevented by the use of clamp-foreeps on the cardiac side of the line along which the stomach is to be divided, as well as on the pyloric side; we believe that when the stomach is full of fluid, it is absolutely impossible for the fingers alone to grasp the divided edges with any degree of security, the powerful retraction of the muscular wall under the stimulus of the knife being beyond the control of the fingers.

We have no doubt that in this case the peritonitis resulted from the escape of gastric contents into the area of the wound; the gauze employed as packing was inadequate to absorb the very large amount which escaped.

The other feature calling for remark is the discovery post-mortem of a small cancerous gland in the lesser omentum near the cardiac end of the stomach. It would appear that the earliest secondary growths in cases of pyloric cancer are met with in the shape of enlarged glands along one or other, or both, of the curvatures of the stomach. It is important, therefore, before deciding on the removal of a pyloric cancer, that the curvatures should be explored by the finger throughout their whole length. Had the gland referred to been discovered on our initial exploration of the belly cavity, we should probably have not proceeded to perform the radical operation.

CASE II. RESECTION OF THE PYLORUS FOR CANCER.— RECOVERY.

Mrs. D., æt. 46, married; was admitted to the Deaconess Hospital on the 24th April 1896, on the recommendation of Dr. Goodenough, of Dysart, complaining of vomiting and pain in the stomach, which had been present with little inter-

mission since the end of the previous year. The patient's family history was negative. Her own health had always been excellent until this illness. On admission, the patient looked emaciated, and stated that she had been losing weight considerably. She did not know, however, what her previous weight had been. Her weight on admission to the Hospital was 6 st. 1 lb.

The patient had very few teeth, and these were bad. The lips and gums were of a good colour, the tongue was tremulous and slightly furred. The appetite had been good until recently. At the time of her admission there was no pain after taking food, and the meals were eaten without discomfort, but the patient almost always vomited at night what she had eaten during the day, sometimes before going to bed and sometimes afterwards. Occasionally she was sick during the day, but it was much more commonly at night.

The pain was described as "a sickly pain, not a crying-out pain"; the patient felt it worst when lying on her back, and obtained some relief by turning on the side. On examination of the abdomen there was no visible swelling. The area occupied by the liver was of normal size, the stomach was distended, its lower margin reaching almost to the umbilicus, and splashing sounds were produced without difficulty. On careful palpation of the abdomen, a considerably increased sense of resistance was felt beneath the right rectus muscle below the costal margin. This area was somewhat tender on pressure. Some of the vomited matter, which had a brownish colour and a sour smell, was filtered and tested. It contained absolutely no trace of free hydro-chloric acid.

In this case, again, there could be no hope of permanent improvement except by operation. The symptoms pointed strongly to pyloric obstruction of malignant origin. The facts of the case were fully placed before the patient's family by Dr. Goodenough, and her husband came to see us and to talk the matter over with his wife. They gladly grasped at the possibility of any relief, and it was therefore arranged to explore the abdomen.

The patient was therefore fed for a few days on peptonised milk, and in order to diminish as far as possible the

septic condition of the alimentary tract, β naphthol was administered in full doses.

It was decided not to wash out the stomach beforehand, but to do so during the progress of the operation, if the organ contained any considerable amount of fluid. The bowels were freely opened on the day preceding the operation.

On 9th May 1896 she was anæsthetised with chloroform. In the area in which resistance had been felt behind the right rectus muscle, close to the ribs, a definite, hard, nodular, freely movable tumour, about the size of a Tangerine orange, was easily recognised under the influence of the anæsthetic.

The belly was opened in the middle line; the stomach only contained a little gas; the tumour was found to be limited to the pyloric segment of the stomach, with two enlarged glands the size of beans along the greater curvature. The tumour was adherent to the gall bladder. In other respects the conditions were favourable for the removal of the cancer.

The details of the operation were similar to those in the preceding case; the adhesions to the gall bladder were separated without difficulty. In making the section through the stomach, in addition to the clamps applied on the pyloric side of the proposed line of section, a clamp was also applied on the cardiac side of the proposed line, from the side of the greater curvature, so that the assistant's fingers had only to control the segment next the lesser curvature, and as the section was made bit by bit, additional forceps were applied one after the other to the cut edges before the section was completed. By proceeding in this manner there was no escape whatsoever of gastric contents. The enlarged glands were removed along with the tumour and adjacent segment of omentum. The section, both of the duodenum and of the stomach, was made $\frac{3}{4}$ in. beyond what was felt from the outside by the finger as cancerous infiltration of the wall of the viscera. The closure of the divided stomach was barely completed when it was noticed that the divided duodenum had partly retracted from the grasp of the clamp-forceps, and that free hæmorrhage was taking place from the gastro-duodenal and other vessels; these were secured with considerable difficulty.

Fortunately, no leakage had taken place of the duodenal contents into the wound. The stomach and duodenum were then approximated by a 1-in. Murphy's button, as in the preceding case, and the viscera replaced in their proper relative position.

The operation occupied an hour and thirty minutes; time was lost, however, through the initial stoppage of respiration, and through the difficulty in securing the duodenal vessels, caused by the viscus having partially escaped from the controlling clamp.

For three days her condition caused considerable anxiety; she vomited sour, brown coloured fluid from time to time, and the breathing was laboured and rapid (40 per minute). She was nourished per rectum every four hours. Strychnine was given hypodermically. On the 4th day she began to improve; she lay comfortably on her right side; there was no sickness; she was therefore given peptonised milk and Valentine's beef juice by the mouth.

From the 7th day onwards she was constantly hungry, anxious to have solids instead of the liberal allowance of fluids.

On the 19th day her diet had reached the following dimensions:—Ordinary milk *ad libitum* (about 3 pints), 2 eggs, 1 pint beef tea, Carnrick's peptonoids four times a day, farola and arrowroot alternately, oatmeal porridge and milk at night (by special request). The bowels were moved every second day by a tablespoonful of castor-oil; she was gaining strength daily, and visibly putting on flesh. She had no pain and no discomfort after eating. The abdominal wound healed by first intention.

By the 28th day she was taking ordinary diet, and her weight, which had necessarily fallen immediately after the operation, was raised to $6\frac{1}{2}$ stones. On the 25th June (the 47th day) she is quite well, and is out walking daily. The Murphy's button has not yet been passed.

The specimen removed measured 11·5 cm. ($4\frac{1}{2}$ in.) along the greater, and 7 cm. ($2\frac{3}{4}$ in.) along the lesser curvature. It presented in its interior a projecting cancerous tumour, reducing the lumen of the pyloric opening to that of a crow quill; the cancer stopped abruptly at the pyloric orifice;

within the stomach it had extended in a uniformly circular manner, the edge of the tumour tissue projecting as a well-marked ridge. There was no appreciable cicatricial contraction or stricture. Microscopically the tumour was found to be a cancer of characteristic scirrhus or alveolar type, extensively infiltrating the muscular coat.

It may be inferred, from our having recommended and carried out the radical operation in the above cases, that we conscientiously believe that in cancer of the pylorus, as in carcinoma of other parts of the body, the welfare of the patient depends upon the earliest possible excision. We do not agree with Treves, who, in his "System of Surgery," which has just been published, states that "there is nothing to recommend the operation." We are inclined rather to follow the teaching of Billroth, Kocher, Czerny, Schede, Krönlein, Wölfler, Gussenbauer, Mikulicz, Lauenstein, Rydygier, Langenbuch, and others, who maintain that in selected cases pylorotomy is to be looked upon as the operation of the future. The mortality has been reduced to 20 per cent. (*vide* the most recently published cases by Kocher), a percentage which compares favourably with that of many other operations for cancer which enjoy the patronage and sanction of the most conservative of surgeons. Along with the reduction of the mortality from the operation, there has been a still more gratifying extension of the duration of life and enjoyment of health in those who have survived; reference, for instance, may be made to one of Kocher's cases, the patient being perfectly well and free from all signs of recurrence five years and four months after the operation. The authorities quoted agree as to the necessity of restricting the operation to selected cases. It would appear that when the cancer can be diagnosed with certainty, it is no longer suitable for radical operation; when it forms a tumour distinctly palpable through the abdominal wall, it is likely to be already adherent to adjacent viscera, and there are probably secondary growths in the lymphatic glands.

In cases, therefore, in which the existence of cancer of the pylorus is inferred from the clinical features, *i.e.* dilated stomach, obstructive symptoms, absence of free acid, and rapid wasting, an exploratory laparotomy is to be recom-

mended. Should the case prove to be one of cancer, the opportunity is afforded for radical treatment at a stage in the progress of the case at which such treatment holds out a prospect of recovery. If, on the other hand, the suspicion of cancer should prove to be unfounded, or a cancer is discovered which is beyond the resources of the surgeon, no harm is done by such exploratory laparotomy; the proceeding has not ended fatally or been followed by hernia in any of our cases; on the contrary, we have observed, as others have done, that in a certain proportion of the cases a remarkable improvement in the symptoms has followed upon exploration of the abdomen, in which an irremovable cancer has been discovered.

As regards the method and technique adopted in resection of the pylorus for cancer, we have followed as closely as possible the recommendations of Kocher, as stated in his work on Operative Surgery. Special stress is to be laid upon the exclusive use of sterilised salt solution within the abdomen, excepting only for the disinfection of the edges of the divided bowel and stomach by corrosive sublimate, 1 to 1000; upon the fearless use of reliable clamp-forceps for securing the stomach and intestine prior to section; and upon the use of continuous silk sutures for closing the wound in the stomach. The insertion of the duodenum into a special opening on the posterior wall of the stomach is also a factor of much importance; instead, however, of joining the viscera by a series of sutures, we have adopted the mechanical device of Murphy, of Chicago, thereby saving valuable time and ensuring accuracy of approximation.

Washing out the stomach as a preliminary to operation would not appear to be essential. The best attitude for the patient after the operation is to lie on the right side.

In conclusion, we embrace the opportunity of expressing our thanks to Drs. Veitch and Goodenough, who shared with us the responsibility of recommending the operation in their respective patients, to Mr. Harold Stiles and to Mr. Logan Turner for valued assistance in operating, and to Dr. Cattanaach, the resident medical officer, as well as to the nursing staff of the Deaconess Hospital, for their untiring devotion to the patients under their care.

